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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

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OFFICE OF THE SECRETARY

In the Matter of: 1998 Biennial Regulatory Review -- Amendment of Part 18 of the Commission's Rules to Update Regulations for RF Lighting Devices	ET Docket No. 98-42

Reply Comments of Satellite CD Radio, Inc.

Satellite CD Radio, Inc. ("CD Radio") replies to comments in the above captioned proceeding, which proposes to amend Part 18 of the Commission's Rules to update regulations for radio frequency (RF) lighting devices.[1] CD Radio's interest in this proceeding is to ensure that out-of-band emission limits be adopted for unlicensed RF lighting devices operating in the 2400-2500 MHz (2450 MHz) frequency band that adequately protect licensed satellite digital audio radio service ("Satellite DARS") operations in the nearby 2320-2345 MHz frequency band.

The Communications Act, and the agency's rules, require that RF lighting devices not cause harmful interference to any authorized radio service. Yet, the record thus far overwhelmingly establishes that the proposed out-of-band limits are highly unlikely to protect licensed services. Furthermore, the record at this point does not contain sufficient information to

[1] 1998 Biennial Regulatory Review – Amendment of Part 18 of the Commission's Rules to Update Regulations for RF Lighting Devices, ET Docket No. 98-42, 63 Fed. Reg. 20,362 (Apr. 9, 1998) ("*NPRM*").

permit the Commission to adopt rules for RF lighting devices that would protect licensed services. In these circumstances, the Commission should require proponents of RF lighting devices to supply the necessary additional data before the Commission continues with a rulemaking.

Only a single commenter, Fusion Lighting—a manufacturer of RF lighting devices—supports the proposed rules. Fusion supplies no technical data that would permit the Commission and interested parties to analyze the interference potential of large numbers of RF lighting devices used as street lights. As several commenters point out, Fusion's central premise—that microwave ovens and RF lights have similar interference potential—has practical and technical flaws. Fusion's other argument—that the Commission should be guided by proposed CISPR guidelines—ignores the CISPR guideline's own recognition that more stringent limits may be necessary to prevent interference with licensed services.

Fusion also fails to acknowledge the obligation of a Part 18 manufacturer to accept the costs of filters or shields to prevent interference with licensed services, especially those such as Satellite DARS where licensees have paid hundreds of millions of dollars in an FCC auction and are well along in the expenditure of billions more to implement their systems.

I. Fusion's Simplistic Comparison Of RF Lighting Devices With Microwave Ovens Does Not Offer Assurance That The Proposed Rules Will Protect Licensed Services

Fusion's greatest technical error in support of the proposed rules is its assertion that RF lights can be analogized to microwave ovens for the purposes of determining appropriate out-of-band emission limits. As noted by many of the commenters, both the potential proliferation of RF lights outdoors and their operational characteristics preclude any such comparison's value to

establish the impact of RF lights on licensed services in nearby bands.[2] Fusion Lighting erroneously relies on the vast number of consumer microwave ovens along with the "continuous operation" of commercial microwaves to support its conclusion that RF lighting should be treated the same as microwave ovens for interference purposes.

The first error is Fusion's failure to recognize that only certain commercial microwave ovens—relatively few in number compared to consumer ovens—exhibit the "continuous operation" characteristic that is central to the comparison with RF lights. Consumer microwave ovens operate only intermittently, as do many commercial units.

The second error is that Fusion ignores the fact that microwave ovens are located in homes, restaurants, and industrial areas, whereas RF lights may be concentrated on streets, parking lots, or public places, presenting multiple sources of interference to car-based Satellite DARS receivers.

Fusion's third error is that it disregards the shielding of the structures in which microwave ovens are operated, unlike RF lights, many of which will be in the open.

Fusion's fourth error is to claim that microwave ovens are suitable surrogates for RF lights, even though the ovens will generally be located at much greater distances from Satellite DARS antennas on vehicles than will RF street lights.

About the only similarity that remains is that both microwave ovens and RF lights generate microwave energy. Considering the substantial differences between microwave ovens

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[2] *See Comments of American Mobile Radio Corporation ("AMRC")*, at 2; *Comments of Satellite CD Radio Inc.*, at 10; *Comments of the IEEE 802 LAN/MAN Standards Committee,* at 5-7; *Comments of the Wireless LAN Alliance*, at 2-3; *Comments of ADTRAN, Inc.*, at 3; and *Comments of METRICOM, Inc.*, at 3-4 & 9.

and RF lights that are relevant to an interference analysis, the Commission cannot find on this record that the out-of-band emission standards for microwave ovens would protect Satellite DARS or other licensed services from harmful interference caused by RF lighting.

II. CISPR Standards Recognize The Possible Need Of Lower Out-Of-Band Emission Limits To Prevent Interference With Radio Services Such As Satellite DARS

Fusion's call for international harmonization with proposed CISPR emission standards is misplaced and misleading. CISPR standards, as cited in Fusion's comments, provide an upper limit for permissible emissions but expressly recognize that the recommended limits may be inadequate to prevent interference with radio services such as Satellite DARS. The critical note to the CISPR radiation limit tables is remarkably absent from Fusion's quotation of the CISPR tables in the main body of its comments.[3] The note appears in the original tables reproduced in Fusion's Appendix I and states: "Note: For the protection of radio services, competent national authorities may require lower limits."[4] This statement evidences a clear understanding that the proposed CISPR limits may not be sufficient to prevent interference with radio services such as Satellite DARS and that it may be necessary for the Commission to impose stricter emission limits.

Further information and study are required to determine the proper out-of-band emission limits to prevent interference with Satellite DARS. The Commission, however, should not be unduly constrained by the recommended CISPR peak radiation limits since, as most of the

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[3] *Comments of Fusion Lighting,* at 8 n.9 & 10.

[4] *Id..,* at Appendix I, Tables 6-8.

commenters' analyses show, those limits are inadequate to protect licensed services from interference by the proliferation of unlicensed RF lighting products.

III. The Balance Of Costs And Equities Favor Requiring Filters Or Shielding In RF Lights To Prevent Harmful Interference With Licensed Services

Based on the information available in the record, the balance of costs and equities clearly favor placing the burden of installing filters or shielding on unlicensed RF lights rather than requiring authorized Satellite DARS receivers to accept excessive noise. The concern of CD Radio is strictly with the out-of-band emissions of RF lighting, so Fusion's platitudes against the imposition of in-band limits is inapposite. RF lighting systems, like any ISM device, are required to be designed "with sufficient shielding and filtering to provide adequate suppression of emissions on frequencies outside the [center] frequency bands."[5] As noted by Aironet, the cost of complying with emission limits has historically been borne by Part 15 and 18 manufacturers and no exception is warranted for RF lighting.[6]

While additional data on actual costs of installing shields and/or filters on RF lights would be helpful, the available information demonstrates that the expenses incurred to comply with out-of-band limits would not be cost prohibitive. By Fusion's own estimates, the "custom" filters required to meet the proposed conducted emission limits would cost 13-17 % of the power supply cost.[7] Fusion conceals both the actual dollar amount and the percentage of total unit cost, not just power supply cost (which will certainly be lower than 13-17 %). Thus it is impossible to

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[5] 47 C.F.R. § 18.109 (1997).

[6] *Comments of Aironet Wireless Communications, Inc.*, at 1.

[7] *Comments of Fusion Lighting*, at 4.

determine to what extent, if any, these costs would constrict demand for RF lights. Estimates by AMRC suggest that radiated emissions could be reduced below proposed levels at "minimal cost" and line filters to suppress conducted emissions could be installed for less than one dollar per unit.[8] At such cost levels, RF lighting could remain cost-effective. In any case, even if it would be relatively more expensive to comply with out-of-band emission limits, any compliance expense would be significantly less than the loss of potential public interest benefits of adjacent licensed services.

In any event, Fusion should be required to keep its emissions well within the 100 MHz band allotted to ISM. It should limit its operational bandwidth to a narrower band if necessary to stay within the allotted 100 MHz after accounting for aging or environmental effects.

Moreover, it has not been (and cannot be) shown that it is either lawful or more reasonable and equitable to shift onto Satellite DARS licensees the costs of coping with increased noise levels caused by RF lights. There is no practical or inexpensive way for Satellite DARS to reject unwanted RF light microwave interference. The proposed field strength limits for individual non-consumer RF lights are well above the receiver noise power for Satellite DARS, which is a recipe for destructive interference, especially when the additive impact of multiple clusters of RF street lights is considered. A bandpass filter is impracticable for Satellite DARS because much of the noise that must be rejected is by definition in the same frequency band as the Satellite DARS signal.[9] Increasing satellite radiated power to compensate for this

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[8] *Comments of AMRC*, Affidavit of Richard Michalik, at 1.

[9] *Id.*, at 1. In any event, such a filter would introduce a 2-3 dB insertion loss that would additionally degrade the Satellite DARS signal.

loss is not practical due both to prohibitive cost and the inability to increase radiated power without adversely affecting coordination with Canada and Mexico. Consequently, proponents must provide measured data on out-of-band interference before RF lighting is given unfettered, unlicensed authority for widespread deployment.

The Commission's rules for ISM devices require that the devices not cause harmful interference to authorized services and that ISM operators take appropriate measures to correct any problems.[10] In this case, all equities favor protecting in-band licensed signals from out-of-band unlicensed services through strict limits on out-of-band emissions rather than laxer limits plus ad hoc resolution of problems. CD Radio paid its $83.3 million auction license fee with the reasonable expectation that use of its assigned frequency band would not be degraded or destroyed by users of unlicensed devices in adjacent bands. The Commission has determined that licensing Satellite DARS service is in the public interest and failure to protect that service from interference would defeat the public interest objectives. There is no practical way to monitor and correct unlicensed RF lighting interference to Satellite DARS. In sum, there is simply no justification for imposing on CD Radio, and the millions of customers that will soon benefit from its service, significant signal degradation to accommodate unlicensed devices facing an uncertain market, especially when the costs of protecting Satellite DARS appear reasonable.

IV. Conclusion

There is insufficient record evidence to provide a reasonable and supportable basis for a finding that the proposed rules will adequately protect licensed services. Under Section 18.109 of the rules, RF lighting devices are required to avoid interference with licensed radio services.

[10] 47 C.F.R. § 18.115(a).

Without detailed information on filtering, shielding and orientation of emitters in RF lighting devices, it is impossible to conclude that such devices could meet this condition with the proposed out-of-band limits. In such a state of affairs, it would be imprudent for the Commission to proceed with the subject rulemaking until a more complete picture can be put together.[11]

As CD Radio pointed out in its Comments, the proposed out-of-band emission limits rely on a consumer/non-consumer dichotomy that is not consistent with the probable impact on other spectrum uses in the real world.[12] As a result, the proposed RF lighting rules allow severe interference to adjacent services, including Satellite DARS, that are well above the ITU's standard definition of harmful interference.

The microwave oven analogy is fundamentally worthless in this context, claims of unacceptable cost to limit out-of-band emissions are flimsy and even unsupportable, and all equities favor protection of Satellite DARS and other licensed services. Further study, particularly into the effects of multiple RF lights in street light applications, is absolutely crucial before appropriate rules can be developed. In view of the foregoing, the Commission should decline to adopt the proposed rules. Only after RF lighting proponents submit the necessary additional information will the Commission be in a position to issue a further NPRM that proposes realistic limits.

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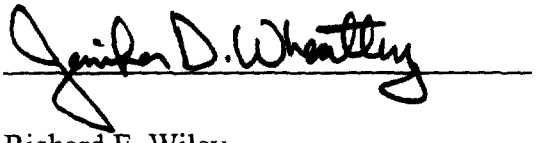
[11] The National Association of Broadcasters ("NAB") advocates delaying the relevant determination until the record is complete in a pending rulemaking, ET Docket 98-80, regarding broader conducted emission limits for Type 15 and 18 devices. *Comments of National Association of Broadcasters,* at 4.

[12] NAB also argues that the residential/non-residential dichotomy is artificial, impractical, and should be eliminated. *Id.,* at 2-3.

Respectfully submitted,

SATELLITE CD RADIO, INC.

By: 

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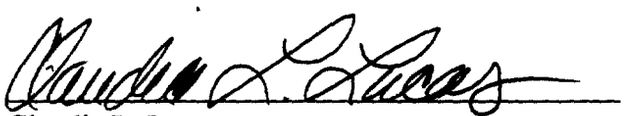
CERTIFICATE OF SERVICE

I hereby certify that on this 24th day of August, 1998, I caused copies of the foregoing **CD Radio RF Lighting Reply Comments** to be mailed via first-class postage prepaid mail to the following:



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